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A STUDY ON 'STUDENTS AWARENESS, ATTITUDE AND BEHAVIOUR TOWARDS ENERGY CONSERVATION'

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Abstract: At present humans' main energy source is non-renewable fossil fuels. If this rate of energy consumption continues, it will increase demand on energy supply and other problems like global warming, severe climate change etc. One of the factors responsible for global warming is energy production. Carbon emission released from the energy production process generates greenhouse gases. The solution to reduce energy demand and global greenhouse gas emission is reduction in the consumption of energy. Greater consumption today implies less consumption tomorrow. So, energy conservation should be done for energy security to reduce unstable energy price, and global warming etc. Many universities and colleges are undertaking large-scale environmental sustainability efforts. The University has undertaken various efforts to reduce the negative environmental impact. It launched an awareness campaign by placing numerous posters in campus buildings, to encourage students to reduce their energy usage by turning off lights, using staircase instead of lifts for few floors etc. The purpose of this study is to find out the effectiveness of specific behaviour change, in reducing the energy consumption by university students.

Keywords: Environment, Energy Conservation, Awareness, Behaviour.

INTRODUCTION

The steadily raising human population is a burden to world resources. It leads to higher energy demand. The continuous rise in energy demand increases the production price higher, uncertain future energy supply etc. If this rate of consumption continues, it will increase the energy demand, global warming and cause severe climate change. One of the factors responsible for global warming is energy production. Carbon emission released from the energy production process generates more greenhouse gases. The solution to reduce the energy demand and global greenhouse gas emission is reduction in the consumption of energy. Energy conservation is a major solution for sustainable energy. The term energy conservation means, using less of energy service and therefore saving the energy.

Higher education institutions are appropriate in promoting a sustainable future. These institutions should go further than adding classes on environmental issues. Large universities with numerous equipments and facilities are aiming for energy conservation. The university encourages the student community to move around

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the campus on university buses which are provided at free of cost. Such efforts reduce the number of vehicles moving in the campus. University has taken efforts to reduce the carbon gas release into the environment by banning usage of plastic bags in canteens on campus. The university has launched an awareness campaign by placing numerous posters in various spots in the campus, to encourage students to reduce their energy usage by turning off lights, using stair case instead of lifts, for few floors etc.

SCOPE OF THE STUDY

This study aimed to investigate the awareness and behaviour on energy conservation among the university students in Vellore district, Tamil Nadu. This study will help the university authorities to improve the campaign in their campus.

OBJECTIVES OF THE STUDY

1. To assess the students knowledge related to environment, energy conservation.
2. To evaluate the effectiveness of the strategy.

LITERATURE REVIEW

G. Davis and *et al.* (2009) characterized the sustainable attitudes and behaviors (including recycling and waste minimization, energy efficiency, water conservation and "green" purchasing) amongst non-academic staff. The theory of planned behaviour used for systematic investigation of the factors which influence behavioural choices. Differences in opinions were found among the demographic groups. Respondents are knowledgeable of strategies for increasing sustainability in the workplace. The potential barriers for implementing such strategies are cost, the level of commitment from management and staff, support and infrastructure, negative attitudes and a lack of knowledge.

Gwyneth L. Moody and Peter G. Hartel, (2007) have found that a majority of faculty was aware of the ELR but students were not. Though they were aware, most faculties do not know the specifics of the two ELR criteria. Both of them supported the idea of an ELR. The ELR increased student knowledge and concern for environmental issues and also changed some students' behavior. A majority of students and faculty were also satisfied with the ELR criteria.

Kristin Marcell *et al.*, (2004) conducted a community-based social marketing (CBSM) campaign to reduce student electricity use and greenhouse gas emissions at Tufts University. Two upper-class dorms were used for the study. Students in the control dormitory were exposed to an educational program on climate change, how their electricity and computer use creates greenhouse gas emissions. Students in the experimental dorm were exposed to both educational program and social marketing campaign encouraging students to turn personal computers off when not in use. The social marketing campaign had a greater impact on student

environmental knowledge, attitudes, and behaviors than the educational program alone. Many students told that they learned the connection between their computers and climate change. Most of the students in both the groups showed a behaviour change by turning off computers, lights, or appliances or enabling the energy star function on their computers.

Matthew James, Karen Card, (2012) have found the factors that contributed to achieving environmental sustainability. The six factors identified are green campus operation measures; campus administration, organization, and leadership; teaching, research, and service; campus-wide actions and activities; institutional assessment of campus sustainability measures; and established methods for overcoming barriers. The institutions achieved sustainability success by highly progressive, persistent, and environmentally knowledgeable facilities staff leader, by using both a top-down and bottom-up approach in sustainability changes. The institutions used activism efforts, such as seminars, open lectures, dedicated sustainability web sites, newsletters, print material, student organizations, and guidance booklets, as effective means of raising sustainability awareness also used proficient mechanisms to monitor campus sustainability progress, and especially campus energy consumption and carbon production. It overcomes the financial barriers by making sustainability initiatives an internal budget priority.

Kim and Joy (2012) reported that Pre and post comparisons showed significant changes in students' knowledge of social and environmental issues relevant to the apparel and textile industry. The study found no significant adjustments in apparel purchasing behavior. A post hoc analysis indicated that students with high knowledge of these issues do not report more engagement in sustainable apparel-purchasing.

John E. Petersen *et al.*, (2007) have made an attempt to understand how resolutions of socio-technical feedback, combined with incentives, encourage students to conserve resources. The initiation of feedback, education and incentives resulted in 32 per cent reduction in electricity use and 3 per cent reduction in water use. Feedback was more effective at conservation of reducing their electricity consumption.

RESEARCH METHODOLOGY

This study used the primary data. A structured questionnaire was used to gather information. The data was obtained from the university students directly. Survey technique was used for collecting the data. Simple random sampling procedure was used for sampling and 75 samples were collected from the respondents. Additional information was collected from the available sources such as books, journals and dailies. The study area was Vellore district. The data collected from respondents were edited, analyzed and presented in the form of tables. These data are analysed through percentage analyses, chi-Square analysis and Anova.

DATA ANALYSIS AND INTERPRETATION

The data analysis was performed in Statistical Package for Social Sciences (SPSS) and the results were presented in tables, charts, and diagrams.

Demographic Variables

Socio - Demographics		*N*	*%*
Gender	Male	40	53.3
	Female	35	46.7
	Total	75	100.0
Socio - Demographics		*N*	*%*
Pocket money for a month	0 - 500	21	28.0
	501 - 1000	10	13.3
	1001 - 1500	16	21.3
	1501 - 2000	10	13.3
	Above 2000	18	24.0
	Total	75	100.0
Place of residence	House	61	81.3
	Hostel	12	16.0
	Other	2	2.7
	Total	75	100.0
Having Vehicle	Yes	47	62.7
	No	28	37.3
	Total	75	100.0
Type of vehicle	Cycle	6	8.0
	Two-Wheeler	35	46.7
	Car	6	8.0
	Not Applicable	28	37.3
	Total	75	100.0
Mode of Transport	By walk	10	13.3
	Using public transport	14	18.7
	By College Bus	12	16.0
	By Cycle	4	5.3
	By Bike	25	33.3
	By Car	4	5.3
	By Auto/Share auto	6	8.
	Total	75	100.0

- 28 per cent of the students are receiving less than Rs 500 as pocket money per month, 24 per cent of them receive more than Rs. 2000/-.
- 81 per cent of them come from their own houses while 16 per cent of them are staying in hostel. The remaining 3 per cent have alternate accommodations.
- 63 per cent of them have own vehicles. The remaining 37 per cent do not have vehicle.

- 47 per cent of the respondents stated that they had two wheelers, while 8 per cent of them stated that they own cars and another 8 per cent stated that they own cycles.
- 33 per cent of the respondents are coming to college by bike, while 18 per cent use the public transport and 16 per cent are using university bus.

Knowledge Variable	*S.A*		*A*		*N*		*D*		*S.D*	
	N	%	*N*	%	*N*	%	*N*	%	*N*	%
The present world is facing energy related challenges.	47	62.7	28	37.3	-	-	-	-	-	-
Petrol, diesel, coal are non-renewable resources which cannot be regenerated	48	64.0	25	33.3	2	2.7	-	-	-	-
Ozone layer absorbs ultraviolet light which known to cause cancer.	38	50.7	31	41.3	4	5.3	2	2.7	-	-
Without ozone layer no life could exist on earth	36	48.0	23	30.7	16	21.3	-	-	-	-
The air is polluted by the emission of carbon-di-oxide from vehicle.	43	57.3	22	29.3	4	5.3	6	8.0	-	-
Air pollution leads to respiratory diseases.	38	50.7	35	46.7	-	-	2	2.7	-	-
Saving energy is needed to avoid the uncertain future energy supply	33	44.0	26	34.7	14	18.7	2	2.7	-	-
More energy is consumed to turn on and off the light.	19	25.3	38	50.7	16	21.3	2	2.7	-	-
Energy saving is done by using stair-case instead of lift	38	50.7	19	25.3	14	18.7	2	2.7	2	2.7
Energy saving is done by turning off the unused lights and fans in the classroom.	35	46.7	37	49.3	-	-	3	4	-	-
A single electrical light that is burning unnecessarily is a contributor to environmental degradation.	28	37.3	20	26.7	25	33.3	2	2.7	-	-
Energy saving is done by using university buses to move around the campus instead of the own vehicle.	24	32.0	33	44.0	16	21.3	2	2.7	-	-
Each individual can do something towards energy saving and that leads collectively to a real change.	36	48.0	26	34.7	10	13.3	3	4.0	-	-
I am efficient in my own-energy use	32	42.7	20	26.7	23	30.7	-	-	-	-

- 63 per cent of them strongly agree that the present world is facing energy related challenges. 51 per cent strongly agree that the ozone layer absorbs ultraviolet light which is known to cause cancer. 51 per cent strongly agree that the energy saving can be done by using stair-case instead of lift. An overall analysis of the table gives us a picture that the current generation is aware of environmental issues and need for energy conversation.

EFFECTIVENESS OF ENERGY CONSERVATION STRATEGIES

The university follows a policy of sending emails on regular basis to all students instructing energy conservation as much as possible.

- Of the total number of respondents 81 per cent of them have a laptop or desktop of their own and 73 per cent of them have internet connection. 19 per cent of the students are checking their mails daily on daily basis. 5 per cent of them check their mails once in four days. 15 per cent once in two days, 20 per cent weekly once and 41 per cent rarely.
- 7 per cent of the respondents were "often" aware of receiving such energy saving e-mail while 53 per cent were aware "sometimes" and 37 per cent were "never" aware.

REASONS FOR USING STAIRS

The University buildings are multistoried and have both staircase and lift facilities. For the first and second floor, students have been instructed to use stairs and avoid lifts.

- 45 per cent of the respondents stated that they "always" use stairs to prove they are young. 28 per cent stated "sometimes", 13 per cent said "often" and another 13 per cent said "never".
- 33 per cent of the respondents use stairs "always" as an exercise followed by 31 per cent said "often" and 24 per cent said "sometimes".
- 39 per cent of the students responded that they "never" take stairs because it is written not to use lift for the first two floors; 29 per cent said they "always" use stairs because of the instructions.
- When given "to avoid waiting for lifts as a reason" 25 per cent said "often", 33 per cent said "sometimes".
- 35 per cent said "often" use staircase to burn calories and 29 per cent use "sometimes" and 25 per cent "never".
- 40 per cent said "sometimes" to save electricity, 27 per cent said "always" and 25 per cent said "never".
- 52 per cent said they "sometimes" use stairs to avoid the crowd in the lift, 28 per cent said "always" and 15 per cent said "often".
- 33 per cent said they "often" use stairs to go to class quickly, 32 per cent said "always" and 21 per cent said "sometimes".
- Majority of the students are conserving their fuel by walking and using University busses inside the campus to move from one building to another building.

CHI SQUARE ANALYSIS

Hypothesis: 1

H0: There is no significant relation between the gender and usage of university buses.

H1: There is significant relation between the gender and usage of university buses.

Chi-Square Test

	Value	*df*	*Asymp. Sig. (2-sided)*
Pearson Chi-Square	3.543[a]	1	.060
Likelihood Ratio	3.561	1	.059
Linear-by-Linear Association	3.495	1	.062
N of Valid Cases	75		

Interpretation: P-value is found to be 0.060 higher than 0.05. H0 is accepted. There was no significant relationship at 5% significance level between the gender and usage of university bus.

Hypothesis 2

H0: There is no significant relation between the gender and response to the word "kindly avoid using lift for first and second floor.

H1: There is significant relation between the gender and response to the word "kindly avoid using lift for first and second floor.

Chi-Square Test

	Value	*df*	*Asymp. Sig. (2-sided)*
Pearson Chi-Square	8.013[a]	2	.018
Likelihood Ratio	8.331	2	.016
Linear-by-Linear Association	7.373	1	.007
N of Valid Cases	75		

Interpretation: P-value is found to be 0.018 lesser than 0.05. H0 is rejected. There was significant relationship at 5% significance level between the gender and response to the word "kindly avoid using lift for first and second floor.

Hypothesis 3

H0: There is no significant relation between having vehicle and usage of university buses.

H1: There is significant relation between having vehicle and usage of university buses.

Chi-Square Test

	Value	*df*	*Asymp. Sig. (2-sided)*
Pearson Chi-Square	10.145[a]	1	.001
Likelihood Ratio	11.005	1	.001
Fisher's Exact Test			
Linear-by-Linear Association	10.009	1	.002
N of Valid Cases	75		

Interpretation: P-value is found to be 0.001 lesser than 0.05. H0 is rejected. There was significant relationship at 5% significance level between having vehicle and usage of university buses.

Hypothesis 4

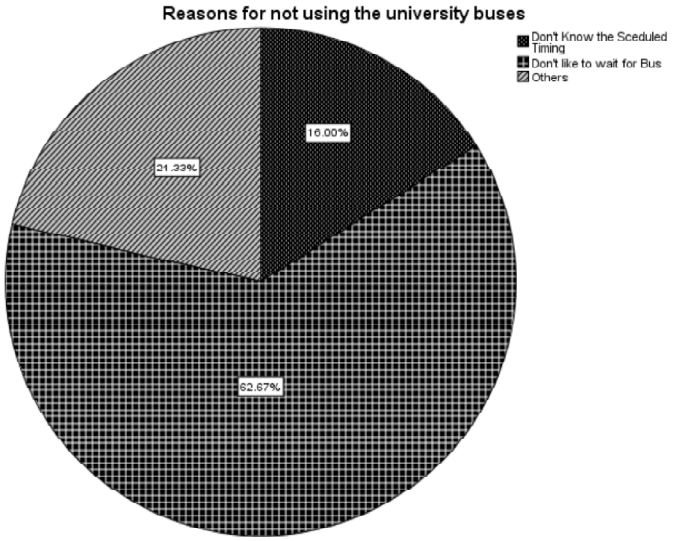
Ho: There is no significant difference between age and energy conservation behaviour.

H1: There is significant difference between age and energy conservation behaviour.

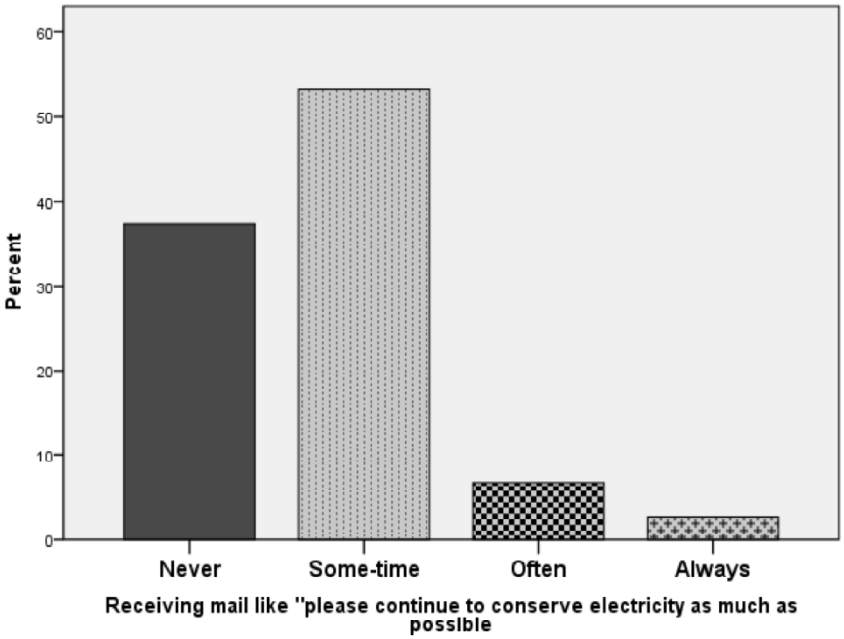
ANOVA

	Sum of Squares	*Df*	*Mean Square*	*F*	*Sig.*
Between Groups	13.174	6	2.196	2.172	.056
Within Groups	68.746	68	1.011		
Total	81.920	74			

Interpretation: The perception towards switching off the fan and lights when they last leave the room does not vary across various age groups.



The above pie diagram shows the reasons for not using the university buses from one building to another building. Majority of the respondents don't like to wait for the buses.16% of the respondents is unaware of the timing of the buses. 21.33% of them are not using due to other reasons.



Interpretation: Majority of the students told that "sometimes" they receive the above said e-mail. 37.3% told they never received such e-mails, 6.7% of them told that "often" they receive such mails and 2.7% of them told they "always" receive such e-mails.

SUGGESTION AND CONCLUSION

This research study was done to identify the knowledge level of the students towards the environment and energy conservation and to evaluate the effectiveness of the strategy on energy conservation. The questionnaire was effective in generating knowledge of the students. More than 50% of the respondents understand the current global situation, such as energy demand, need for energy conservation, global warming, climate change etc.

In this modern era, it is necessary to have a Laptop or desktop in their house. In our study, 81% of respondents possess either a laptop or desktop and out of which 73% of the respondents are connected with net services. The university sends e-mail regarding the energy saving on regular basis. But, it was surprise to note that, two third of respondents are not checking the college e-mails on daily basis.

The University buildings are multistoried, having both staircase and lift facilities. In order to save energy as well as for their health, in the side wall near the ground floor lift, it has been written as "prove you are still young" and avoids using lift for first and second floor". Based on this, questions were asked and nearly 50 % of the respondents are always using the stair and 37% of the respondents are responding to the caption for sometimes. Nearly 70% of the respondents are using the stair cases, to save the electricity and its shows that the students are more aware of the conservation of the energy.

The Lift manufacturing companies by default, they installed some sort of music when the lift is start lifting the students to the concern floor. But, it would be better to insert some slogan instead of music like, "you are healthy and use your foot up to 2nd floor". Also energy conservation slogan such as "Turn off the lights, if it not necessary" or "Energy conserved is Energy generated".

Although, wall stickers are placed in various places, it would be better to fix adequate stickers in different languages in vicinity like canteen, library, laboratory etc, so that, students are exposed more often to that slogans.

Reduction of fuel cost, Air-pollution and Energy Saving are considered as the main reasons from the respondents for utilizing the University bus services. The researcher found that the students are having knowledge about the environment and energy conservation.

However, awareness on these topics has to be broadened with adequate programs. The program should be conducted on regular intervals to strengthen more knowledge about Environment and Energy Conservation.

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